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STUDIES IN RUSSIAN MORPHOLOGY--PART II. VOWEL-ZERO ALTERNATIONS IN DERIVATION.

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THE SECOND IN A SERIES OF REPORTS ON CONTEMPORARY STANDARD RUSSIAN MORPHOLOGY, THIS STUDY INVESTIGATES THE FORMAL DEVICES OF WORD-FORMATION IN RUSSIAN. THERE ARE APPARENTLY TWO TYPES OF VOWEL-ZERO ALTERNATION IN THE RUSSIAN DERIVATIONAL SYSTEM--THE FIRST BEING A MORPHOPHONEME ON THE FLEXIONAL LEVEL, AND THE SECOND IN THE DERIVATIONAL BASE OR DERIVED WORD. THE BEHAVIOR OF THE VOWEL-ZERO MORPHOPHONEME IN BOTH THE FLEXIONAL AND DERIVATIONAL SYSTEMS IS THE FOCAL POINT OF THIS REPORT. (FB)

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D. S. Worth

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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D. S. Worth

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## PREFACE

This Memorandum continues a series of studies of the derivational morphology of contemporary standard Russian. The first in this series is D. S. Worth, Studies in Russian Morphology--I. The Suffix "-aga", RM-3235-PR, August 1962. These studies are being made to add to our understanding of the formal devices by which words are formed in Russian, and ultimately to contribute to automatic analysis and synthesis of this language. By making use of an automatically segmented morpheme dictionary, the present Memorandum analyzes vowel-zero alternations in derivation.

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## SUMMARY

This Memorandum analyzes the vowel—zero alternations of contemporary standard Russian, with emphasis on those alternations that are specific to the derivational (as opposed to the flexional) system. A brief introduction sketches the theoretical generative framework within which the specific techniques of word—formation are considered, and provides a condensed survey of flexional vowel—zero alternations as a contrasting background to the bulk of the Memorandum.

It is shown that there are two types of vowel—zero alternation in the Russian derivational system. In the first type, a flexional—level vowel~zero morphophoneme ({#}) is stabilized as either a full vowel or as zero in the course of derivation. In the second type, a full vowel in the derivational base alternates with zero in the derived word, or vice versa. The existence of a vowel~zero morphophoneme on the derivational level ({%}) is suggested as an explanation for certain of these alternations.

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# STUDIES IN RUSSIAN MORPHOLOGY:

# II. VOWEL–ZERO ALTERNATIONS IN DERIVATION

## 1. INTRODUCTION

Languages that join an elaborate flexional apparatus to a complicated system of word–formation — as is the case in the majority of Slavic languages — can be described only with the aid of a complex set of morphophonemic entities. These entities are of two basic types: items (stems, affixes, boundaries) and processes (rules for concatenating items and for describing the phonetic consequences of such concatenation). The exact border between these two types of entity is by no means clear: certain kinds of information can be included in either the item or the process part of the morphological description (e.g., the palatalization of paired consonants before {e} can be included in the description of Russian stems, or it can be left to the morphophonemic rules of the flexional system). This is not the place to discuss the appropriate balance between the specificity of the information contained in the item descriptions versus that of the process rules (complexity in one part of the morphological description standing in inverse proportion to that in the other part). Rather, we shall examine in some detail one specific morphophonemic entity of contemporary standard Russian (CSR), namely the alternating vowel–zero morphophoneme, and attempt to point out some of the differences in the behavior of this entity in the flexional

and the derivational systems respectively. The present paper, which is a preliminary report on one aspect of derivational morphophonemics, is intended to be suggestive rather than exhaustive.

## 2. FORMAL CONVENTIONS

Throughout this paper, morphophonemic transcriptions are given in curved brackets {}, phonemic transcriptions in slants //, and phonetic transcriptions in square brackets []. Phonemic transcription is used without regard to the question of whether a separate phonemic level exists, as a convenient device for indicating more phonetic detail than can be shown in the morphophonemic transcription, but where full phonetic specification would be irrelevant to the point under discussion. The phonetic transcription used here is that of R. I. Avanesov,[1] with the exception of the reduced mid central vowel, rendered here by [ə]. The morphophonemic transcription is moderately but not optimally "broad": on the one hand, it is broad in not marking the predictable palatalization of paired consonants before {e} or the stress-conditioned reductions of non-diffuse vowels, but on the other hand it uses only the relatively "narrow" alphabetic system, which cannot represent such generalized morphophonemes as the alternating {e ~ o} in

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[1] Avanesov, R. I., Fonetika sovremennogo russkogo literaturnogo jazyka, Moscow, 1956; Avanesov's symbols are transliterated in the usual manner.

identical environments (cf. вёл ~ ве́дший) as a single entity — such representation being possible only with a distinctive feature notation (+ vocalic, – consonantal, – diffuse, – compact). In other words, the morphophonemic transcription used in this paper is a compromise between accuracy and readability; however, the simplifications involved are not relevant to the problems with which the paper is concerned.

The symbols used throughout this paper will be given here, although their full significance and the interrelations among them will in some cases become evident only in the course of the subsequent exposition.

{#} is the alternating vowel–zero morphophoneme of the flexional system, as in день, genitive дня, stem {d'#n'} or окно́, genitive plural о́кон, stem {ok#n}.

[ø] is the phonetically (and /ø/ the phonemically) zero alternant of morphophonemic {#}, appearing where it is necessary for clarity's sake to mark this zero alternant explicitly; otherwise, phonemic and phonetic zero are shown by the absence of a symbol (the genitive singular of день thus appearing as /d'øn'á/, [d'øn'á] or simply [d'n'á]).

{%} and {Ø} are morphophonemic symbols not in general use; they are introduced in this paper to render the alternating vowel–zero morphophoneme of the derivational system ({%}), as distinguished from the flexional {#}, with {Ø}

representing the zero flexional-level alternant of derivational {%}, as in derivational {IG%R} from which are generated the flexional stems {igØr} of игрá, genitive plural игр 'game' and {igór#k} of the diminutive игóрка, genitive plural игóрок; like [ǿ], {Ø} is used only where clarity requires explicitness. (Elsewhere, this symbol is simply omitted, e.g. {igr}.)

Stems in the derivational system are given in capital letters, those of the flexional system in lower-case letters. The boundary between stem and affix is marked by a plus (+), that between stem (simple or complex) and ending by the hyphen (-). The tilde (~) means 'alternating with'. The arrow (→) indicates that the entity to the right thereof is generated from that to the left; arrows with superscripts $\overset{D}{\rightarrow}$ and $\overset{F}{\rightarrow}$ indicate that the rules of generation belong to the derivational and flexional systems respectively, e.g., {B%REG} $\overset{D}{\rightarrow}$ {béreg} $\overset{F}{\rightarrow}$ [b'ér'ьk] in the nominative singular of бéрег 'bank'. Stress will be marked on non-monosyllables as a matter of convenience, but the stress markings have no systematic import.

Further conventions will be introduced and explained as required below.

## 3. THEORETICAL FRAMEWORK

There is no need here to recapitulate the views of the many scholars who have discussed the interrelations of the

derivational and flexional systems.(2) Instead, we shall summarize the theoretical framework, discussed in more detail elsewhere,(3) which serves as background for all the remarks made in this paper. This theoretical framework itself has been advanced only tentatively, as a basis for discussion, and may well stand in need of revision; however, such revision is unlikely to affect the description of the vowel~zero morphophonemes with which this paper is concerned.

The morphological system of Russian consists of two hierarchically ordered subsystems, derivational and flexional. Derivation is anterior (in the synchronic sense) to flexion, since the stems of the flexional system are to a large extent the result of items and processes on the derivational level. The output of the derivational system serves as the input to the flexional system:

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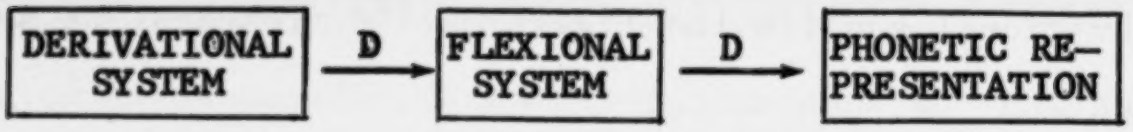
(2) See, for example, V. V. Vinogradov, "Slovoobrazovanie v ego otnošenii k grammatike i leksikologii," Voprosy teorii i istorii jazyka v svete trudov I. V. Stalina po jazykoznaniju, Moscow, 1952, pp. 99–152; A. V. Isačenko, "O vzájomnych vzt'ahoch medzi morfológiou a deriváciou," Jazykovedný časopis (Bratislava), 7, 1953, pp. 200–213; E. Stankiewicz, "The Interrelation of Paradigmatic and Derivational Patterns," Word, 18, 1962, pp. 1–22; and further bibliographical indications in these works.

(3) "The Notion of "Stem" in Russian Flexion and Derivation," to appear in the forthcoming Festschrift for Roman Jakobson.




Since the entities of the flexional system are generated by concatenating items of the derivational system (stems, affixes) with concomitant morphophonemic change (truncation, substitutive softening, interfixation, etc), it is clear that the "stems" of the two systems differ considerably, e.g., the flexional stem {bereg}, which serves to generate all the paradigmatic forms of the word бе́рег, [b'ér'ьk], [b'ér'ьgə], ..., [b'ьr'i$^{e}$gá], etc., cannot serve to generate the derived words безбре́жный, прибре́жный, etc. We assume as a postulate, therefore, that every word has a derivational (D-) stem, adequate to generate both the word's flexional stem and the derivational and flexional stems of all words derived from the given word. The morphophonemic rules of the flexional system (i.e., morphophonemics in the usual sense) serve to generate phonetic representations out of flexional (F-) stems. The morphophonemic rules of the derivational system, which are almost totally uninvestigated, serve two functions: they generate flexional stems out of derivational stems, and they generate derived (secondary) derivational stems out of their primary bases (Russian производящая основа). In somewhat simplified form, this theoretical framework can be schematized as:

$$\begin{array}{ccccc} \{\text{D–STEM}\} & \xrightarrow{\text{D}} & \{\text{F–stem}\} & \xrightarrow{\text{F}} & \left[\begin{array}{l}\text{phonetic re–}\\ \text{presentation}\end{array}\right] \\ \Big\downarrow \text{D} & & & & \\ \left\{\begin{array}{l}\text{DERIVED}\\ \text{D–STEM}\end{array}\right\} & \xrightarrow{\text{D}} & \left\{\begin{array}{l}\text{Derived}\\ \text{F–stem}\end{array}\right\} & \xrightarrow{\text{F}} & \left[\begin{array}{l}\text{phonetic re–}\\ \text{presentation}\end{array}\right] \end{array}$$

The D–stem of a word, as is clear from this schema, stands in a predictive relation both to its own F–stem (and ultimately to the latter's phonetic representation), and to the D–stems, F–stems and phonetic representations of all secondary, tertiary, etc., derivatives of the given word as well.

Against this background, it is clear that the flexional rules will have to generate either a full vowel (symbolized here by [v], without for the moment considering exactly which full vowels occur in which environments) or no vowel ([ø]) out of the flexional morphophoneme {#}, i.e.

$$\{\#\} \xrightarrow{\text{F}} \begin{cases}[\text{v}] \\ [\text{ø}]\end{cases}$$

(without specifying the environments in which the one and the other choice must be made; cf. below). It is equally clear, moreover, that the flexional morphophoneme {#} itself must be generated by a rule of the derivational system out of some entity of the derivational stem, namely out of the derivational vowel~zero morphophoneme {%}. Flexional {#}, however, is but one of the three possible flexional morphophonemes resulting from derivational {%}, the other two being a full vowel (symbolized here by {V}, again

without considering exactly which full vowel obtains in which environments), e.g., {IG%R} → {IGOR+} → {igór#k—}, and the absence of any vowel morphophoneme, namely {Ø}, e.g., {B%REG} → {+BØREG+} → {bezbréž#n—}.[4] This subset of the D—rules will thus have the form (again without specifying environments):

$$\{\%\} \xrightarrow{D} \begin{cases} \{V\} \\ \{Ø\} \\ \{\#\} \end{cases}$$

With these general considerations in mind, we can examine flexional {#} and derivational {%} in more detail, in Secs. 4 and 5, respectively.

## 4. THE VOWEL~ZERO MORPHOPHONEME IN FLEXION: {#}

Although the facts concerning the distribution and various phonetic realizations of the vowel~zero morpho—phoneme in the flexional system of CSR are generally well known, a brief recapitulation may not be out of place here. Stems differ from endings, both in the specific vowels that alternate with [ø] and in the environments that condition the choice of [ø] or [v]. Nominal stems generally show /ó/, /é/, or their unstressed reductions (сон, genitive сна 'sleep'; день, genitive дня 'day'),

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(4) Such derivations are given only informally here; the precise type and order of rules that will generate flexional stems out of derivational stems have yet to be worked out. The derived stem {bezbréž#n—} is formed by concatenating {breg} (from {B%REG} with the discontinuous affix {bez+...#n—}).

verb stems, these same two vowels (жечь, past tense masculine жёг, first person singular present жгу 'burn') plus /i/ in aspect formation (поджига́ть imperfective 'set fire to'); endings have principally /i/ in verbs (infinitives, нести́ 'carry', cf. проче́сть 'read through'; imperatives, неси́! 'carry!' cf. сядь! 'sit down!') but /o/, /u/, /a/ (all rare) in substantive endings (fem. instr. singular водо́й ~ водо́ю 'water', но́чью 'night'; instr. plur. во́да́ми but лошадьми́ 'horses'). The choice of full vowel or zero is determined partially phonetically, partially by paradigm class or stylistically in endings,(5) but it is conditioned almost exclusively by the phonetic environment in the case of stems: morphemes containing {#} reduce it to [ø] before morphemes the first or second segment of which is a full vowel, but vocalize this {#} to a full vowel in all other positions, i.e., before two consonants (подобра́ть, present подберу́ etc., 'pick up'), consonant plus {#} (infinitive жечь 'burn' = {ž#g–t'#} → žeg–t' → [žéč]; past tense {ž#g–l#} → žog–l → [žók]), {#} plus consonant, i.e., a non–vocalic segment, including {j} (plural до́нья of дно 'bottom' = {d#́n+#j–} → dón+j–; instr. singular ло́жью 'lie' = {l#́ž–#ju} → lóž–ju → [lóžʲu]), or {#} alone ({d'#n'–#} → [d'én']).

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(5) A full description of such alternations can be found in Harold L. Klagstad's unpublished dissertation (Harvard University, 1954), Vowel–Zero Alternations in Contemporary Standard Russian.

It must be emphasized that the occurrence of vowel–zero alternations is not automatic, that is, not predictable from the environment in which a stem occurs (the realization of the vowel~zero morphophoneme as [v] or [ø], on the other hand, is predictable), although the occurrence of {#} is more nearly predictable in some form classes than in others. In masculine substantives the occurrence of {#} is completely unpredictable: стрело́к, стрелка́ 'gunner' ({strel#k–}) versus игро́к, игрока́ 'gambler' ({igrok–}), both animate; плато́к, платка́ 'kerchief' ({plat#k–}) versus челно́к, челнока́ 'canoe' ({čolnok–}), both inanimate; ка́шель, ка́шля 'cough' ({káš#l'–}) versus ско́бель, ско́беля 'spokeshave' ({skóbel'–}); ремéнь, ремня́ 'strap' ({rem'#n'–}) versus ячменéнь, ячменя́ 'barley' ({jačmen'–}); соловéй, соловья́ 'nightingale' ({solov'#j–}) versus дуралéй, дуралéя 'nincompoop' ({duraléj–}); наём, на́йма 'hiring' ({naj#m–}) versus поём, поёма 'meadow flooded in spring' ({pojóm–}). The appearance of the "mobile vowel" — i.e., the existence of morphophonemic {#} — is more nearly predictable in the genitive plural of feminines and neuters, but not entirely so: бо́йня, genitive plural бóен 'slaughterhouse' ({bój#n'–}) versus обо́йма, обойм 'cartridge clip' ({obójm–}); тюрьма́, тю́рем 'prison' ({t'ur'#m–}) versus па́льма, па́льм 'palm tree' ({pál'm–}); ку́кла, ку́кол 'doll' ({kúk#l–}) versus игла́, игл 'needle' ({igl–}); судьба́, су́дéб 'fate' ({sud'#b–}) versus про́сьба, про́сьб 'request' ({prós'b–});

ядро́, я́дер 'kernel' ({jad'#r–}) versus (plural only) не́дра, не́др 'womb, bosom' ({nédr–}). In the short form masculine of adjectives, the appearance of a mobile vowel is largely but still not entirely predictable: бы́стрый, бы́стр 'swift' ({bístr–}) versus о́стрый, остёр (and о́стр) 'sharp' ({óst'#r–}); по́длый, по́дл 'vile' ({pódl–}) versus све́тлый, све́тел 'light, clear' ({svét'#l–}). Since in many cases the existence of morphophonemic {#} cannot be predicted from its environment, internal consistency requires that it be stated explicitly as part of the morphophonemic transcription of every stem and ending in which it occurs. Every such stem must therefore be derived from a D–stem by the third of the three possible D–rules described above, namely by the rule {%} $\overset{D}{\rightarrow}$ {#}, e.g., {KÁŠ%L'–} $\overset{D}{\rightarrow}$ {káš#1'–}, {KÚK%L–} $\overset{D}{\rightarrow}$ {kúk#1–}, etc.

## 5. THE VOWEL~ZERO MORPHOPHONEME IN DERIVATION: {%}

Whereas the vowel–zero alternations in Russian flexion are fairly straightforward and systematic, at least in stems, those of Russian derivation are a good deal more complicated. Let us begin with a survey of the facts.

An examination of word families in terms of the vowel–zero alternations occurring therein brings to light two principal classes of alternation: (1) there are words in which the vowel–zero alternation of the flexional stem of the base is eliminated in the derivational process, {#}

being replaced either by a full vowel (type бу́лка, genitive plural бу́лок 'bun', diminutive бу́лочка) or by zero (type лёд, льда 'ice', derived adjective ледо́вый 'icy'); i.e., there are words in which we have the derivational alternations {#} ~ {V} and {#} ~ {Ø} respectively; (2) in other word families, there are no vowel–zero alternations on the flexional level, but such alternations appear when one flexional stem is compared to another, a full vowel of the base corresponding to a zero in the derived form (type ме́бель, ме́бели 'furniture', меблирова́ть 'to furnish') or vice versa (type игра́, genitive plural игр 'game', diminutive игро́рка); i.e., in other word families one has the derivational alternation {V} ~ {Ø} ({Ø} ~ {V}). We shall examine these two classes of alternation in Secs. 5.1 and 5.2 below.

## 5.1. {#} ~ {V} and {#} ~ {Ø} Alternations in Derivation

The rules for vocalization ({#} $\overset{D}{\rightarrow}$ {V}) and elimination ({#} $\overset{D}{\rightarrow}$ {Ø}) of {#} in derivational bases are generally similar to those governing the behavior of {#} in flexion, but there are certain striking differences.

5.1.1. Alternations before consonants. Stems containing {#} vocalize it to a full vowel before suffixes beginning with a consonant (i.e., a –vocalic, + consonantal segment): багро́р, genitive багра́ ({bag#r–}) 'hook, gaff' $\overset{D}{\rightarrow}$ багро́рщик ({bagórš:ik–}) 'fisherman, etc., using a gaff'; ло́дка, genitive plural ло́док ({ló́d#k–}) 'boat' $\overset{D}{\rightarrow}$ ло́дочник

({lódošn'ik–}) 'boatsman'; ковёр, ковра́ ({kov'#r–}) 'carpet' $\overset{D}{\rightarrow}$ ковёрчик ({kov'órčik–}) 'little carpet', etc. There do not appear to be any exceptions to this rule.

5.1.2. Alternations before full vowels. Less stable is the behavior of {#} before derivational suffixes containing a full vowel (i.e., a +vocalic, – consonantal segment). Ordinarily, derivational stems containing {#} eliminate it before vocalic suffixes, but there are a number of exceptions to this general rule. A look at several typical suffixes makes this clear.

The suffix {+ást(ij)}. One finds the expected elimination of {#} in у́гол, genitive угла́ ({ug#l–}) 'corner, angle' $\overset{D}{\rightarrow}$ угла́стый ({uglást–}) 'angular'; вихо́р, вихра́ ({v'ix#r–}) 'cowlick' $\overset{D}{\rightarrow}$ вихра́стый ({v'ixrást–}) 'with a cowlick', etc., but a seemingly unmotivated vocalization of {#} in лоб, лба ({l#b–}) 'forehead' $\overset{D}{\rightarrow}$ лоба́стый ({lobást–}) 'with a prominent forehead'; and ко́рень, ко́рня ({kór'#n'–}) 'root' $\overset{D}{\rightarrow}$ корена́стый ({kor'enást–}) 'thickset, stumpy'. (On the reasons for such anomalies, see below.)

The suffix {+ik}. Derivational stems that contain a full vowel in the first syllable and a {#} in the second, eliminate the {#} as would be expected in derivation before the (diminutive) vocalic suffix {–ik–}: козёл genitive козла́ ({koz'#l–}) 'goat' $\overset{D}{\rightarrow}$ ко́злик ({kózl'ik–}) 'small goat'; and similarly орёл, орла́ 'eagle' $\overset{D}{\rightarrow}$ о́рлик; осёл, осла́ 'donkey' $\overset{D}{\rightarrow}$ о́слик; хохо́л, хохла́ 'cowlick' $\overset{D}{\rightarrow}$ хо́хлик;

чехо́л, чехла́ 'case' $\xrightarrow{D}$ че́хлик; ковёр, ковра́ 'carpet' $\xrightarrow{D}$ ко́врик; ломо́ть, ломтя́ 'round (of bread)' $\xrightarrow{D}$ ло́мтик 'slice'. However, derivational stems that contain no full vowel, but only {#} ("non-syllabic stems" in Jakobson's terminology(6)) vocalize this {#} even before the vocalic suffix {-ik-}: лоб, лба 'forehead' $\xrightarrow{D}$ ло́бик; ров, рва 'ditch' $\xrightarrow{D}$ ро́вик; пёс, пса 'dog' $\xrightarrow{D}$ пёсик; рот, рта 'mouth' $\xrightarrow{D}$ ро́тик.

The suffix {+ist(ij)}. The adjective-forming suffix {-ist-} is more regular in its effect on the {#} of derivational bases than the diminutive {-ik-}.

The majority of derivational bases containing {#} eliminate it before {-ist-}: сте́бель, сте́бля 'stem' $\xrightarrow{D}$ стебли́стый 'many-stemmed'; ко́рень, ко́рня 'root' $\xrightarrow{D}$ корни́стый; ко́готь, ко́гтя 'claw' $\xrightarrow{D}$ когти́стый; но́готь, но́гтя 'nail' $\xrightarrow{D}$ ногти́стый; руче́й, ручья́ ({ruč#j-}) 'stream' $\xrightarrow{D}$ ручьи́стый ({ručjíst-}). Derivational bases containing only {#} do not vocalize it before {-ist-}: лёд, льда 'ice' $\xrightarrow{D}$ льди́стый; пень, пня 'stump' $\xrightarrow{D}$ пни́стый; мох, мха (and мо́ха) 'moss' $\xrightarrow{D}$ мши́стый. Only ка́мень, ка́мня 'stone' and сту́день, сту́дня 'galantine' vocalize the {#} of their stems before this suffix, giving камени́стый and студени́стый.

The suffixes {+iš#k-}, {+yš#k-}. Standard grammars, such as that of the Soviet Academy, list two suffixes in /išk/, a diminutive -yško and a scornful, ironic -iška

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(6) R. Jakobson, "Russian Conjugation," Word, 4, 1948, pp. 155-167.

(from feminines and animate masculines) ~ –iško (from neuters and inanimate masculines). These suffixes would require a separate study, since the existing descriptions do not give an adequate picture of either their formal or their semantic features (e.g., stem–final consonants of the derivational bases are sometimes softened, sometimes not: рот, рта ({r#t–}) 'mouth' gives the diminutive ротúшко; but дон, дна ({d#n–}) 'bottom' has the diminutive дóнышко). We shall return to these suffixes elsewhere; for now let us note only that {#} of the derivational base behaves most erratically. Most of the –a declension derivatives show {#} $\xrightarrow{D}$ {Ø}, e.g., земля́, genitive plural земéль ({zem'#l'–}) 'earth' $\xrightarrow{D}$ землúшка (pejorative); пáрень, пáрня ({par'#n'–}) 'lad' $\xrightarrow{D}$ парнúшка; статья́, genitive plural статéй ({stat'#j–}) 'article' $\xrightarrow{D}$ статьúшка ({stat'jíš#k–}); судьбá, genitive plural сýдéб ({sud'#b–}) 'fate' $\xrightarrow{D}$ судьбúшка; only the "non–syllabic" лёд, льда ({l'#d–}) 'ice' vocalizes {#} in ледúшка 'piece of ice'. The –o declension derivatives are less consistent: {#} is eliminated in the cases of письмó, genitive plural пúсем ({p'is'#m–}) 'letter' $\xrightarrow{D}$ письмúшко; седлó, сёдел ({s'od'#l–}) 'saddle' $\xrightarrow{D}$ сёдлышко; and the non–syllabic лоб, лба ({l#b–}) 'forehead' $\xrightarrow{D}$ лбúшко; but is vocalized in рот, рта ({r#t–}) 'mouth' $\xrightarrow{D}$ ротúшко; дон, дна ({d#n–}) 'bottom' $\xrightarrow{D}$ дóнышко; and сýдно, genitive plural судóв 'boat' (with suppletive loss of {–#n–}, but cf. сýдно genitive plural сýден 'bedpan', obliging one to posit

{sud'#n-}) $\xrightarrow{D}$ судёнышко pejorative and diminutive 'boat'; finally, стекло́ genitive plural стёкол ({st'ok#l-}) 'glass' has both стёклышко and стекóлышко, the former having the meaning both of a diminutive of 'glass' and of 'piece of glass', the latter being rather dialectal and an affectionate diminutive.

The suffix {-ov(ój)}, {-ov(ij)}. The adjective-forming suffix {-ov-} causes the {#} of derivational bases to be eliminated everywhere where the base contains a full vowel in addition to {#}, e.g., огóнь, огня́ 'fire' $\xrightarrow{D}$ огневóй; кóрень, кóрня 'root' $\xrightarrow{D}$ корневóй; у́гол, угла́ 'corner' $\xrightarrow{D}$ угловóй; котёл, котла́ 'cauldron' $\xrightarrow{D}$ котлóвый; ковёр, ковра́ 'carpet' $\xrightarrow{D}$ ковровый. Morphophonemic {#} of the base is also eliminated in a few non-syllabic bases (лён, льна 'flax' $\xrightarrow{D}$ льнóвый; пёс, пса 'dog' $\xrightarrow{D}$ псóвый), but it is more frequently vocalized, as in лоб, лба 'forehead' $\xrightarrow{D}$ лобовóй 'frontal'; лёд, льда 'ice' $\xrightarrow{D}$ ледовóй (and ледóвый); рот, рта 'mouth' $\xrightarrow{D}$ ротовóй; мох, мха (and мóха) 'moss' $\xrightarrow{D}$ моховóй.

The erratic behavior of {#} is apparent from the sampling of suffixes just adduced. In some cases, of course, the historical causes of the appearance of {V} where we would expect {Ø} from {#} are clear: an original full vowel of the stem has been supplanted by the alternating vowel-zero morphophoneme {#}: ка́мень, ка́мня is an innovation from an older -n-stem (cf. OCS kamy, genitive kamene), and one can assume that камени́стый was formed before

{e} > {#}; similarly, коренáстый was presumably formed before the full vowel (cf. OCS koren', genitive korene) had become {#} in кóрень, кóрня. It is tempting to assume that ледóвый (ледовóй), ледянóй, and лéдышка were formed before Old Russian ледъ, леду had become лед, льда but льдúна (льдúнка) and льдúстый after this change; however, without a detailed historical study of derivation, such speculation about relative chronology can have no more scientific value than that about "morphological analogy" or "leveling", the results of which appear equally capricious (Russian швец, швецá, Ukrainian швец, шевця́, Polish szewc, szewca, etc.). In any case, such explanations cannot account for forms like моховóй from мох, мха (мóха) < мъхъ and ротовóй from рот, рта < ръть, and even if — as is unlikely — such a neat historical explanation turned out to cover all the above cases, there is no apparent way to convert this historical knowledge into a morphophonemic description of the modern language. We are left, then, with such anomalous pairs as ротúшко and лбúшко, лобáстый and углáстый, студенúстый and стеблúстый, ледóвый and льнóвый, etc.

The only generalization (concerning the vocalization vs. elimination of {#} in derivation) permitted by the facts so far is that there is a tendency to vocalize non-syllabic bases (i.e., to avoid the non-syllabic form of stems containing {#}) in derivation. This tendency becomes

a law only before the suffix {–ik}, which requires that the stress fall on the presuffixal syllable, whence лóбик, пёсик, рóвик, рóтик; otherwise, variation is the rule, cf. лобáстый but лбúшко, коренáстый but корнúстый, ледóвый and лéдышка but льдúна and льдúстый, etc. Whereas we saw in Sec. 5.1.1. that {#} invariably becomes {V} before a consonantal suffix, Sec. 5.1.2. has now shown us that {#} does <u>not</u> always become {Ø} before a vocalic suffix. In Sec. 5.1.3., we shall see what happens to {#} before suffixes beginning with a segment that is neither consonantal nor vocalic, namely {#}.

<u>5.1.3. Alternations before {#}.</u> Stems containing {#} as penultimate segment invariably vocalize this {#} to a full vowel before suffix–initial {#}. Such sequences of two vowel~zero morphophonemes (i.e., {#C+#}) occur occasionally in the formation of adjectives in {#n} and frequently in the formation of diminutives in {#k} (masculines in -ок and feminines in -ка). Examples of adjectives: закýска ({zakús#k–}) 'appetizer' → закýсочный ({zakúsoč#n–})[7]; убóрка ({ubór#k–}) 'harvesting' → убóрочный ({ubóroč#n–}); литьё ({l'it#j–}) 'casting' →

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[7] A narrow morphophonemic transcription of the flexional stem of those adjectives that have no short forms could do without {#}; however, rather than posit two derivational suffixes, {#n} and {n}, it seems reasonable to posit a single suffix {#n}; since, in the case of the full-form-only adjectives, this sequence will never occur in the environment {___–#}, the {#} of the suffix will never be vocalized.

литéйный ({l'itéj#n–}); семья́ ({sem#j–}) 'family' → семéйный ({seméj#n–}), etc. Incidentally, in the last two examples it is clear that, contrary to the Academy grammar (I, p. 344), there is nothing unusual about the formation of adjectives in –n– from jot–stem substantives; preterminal {#} is vocalized as in the case of all other sequences of {#} in successive syllables. Examples of diminutive substantives; кусóк ({kus#k–}) 'piece' → кусóчек ({kusóč#k–}); у́гол ({ùg#l–}) 'corner' → угóлок ({ugol#k–}); ручéй ({ruč#j–}) 'stream' → ручеёк ({ručej#k–}); бу́лка ({búl#k–}) 'bun' → бу́лочка ({búloč#k–}); льди́нка ({l'd'ín#k–}) 'piece of ice' → льди́ночка ({l'd'ínoč#k–}); земля́ ({zem#l'–}) 'earth' → земéлька ({zemél'#k–}); etc.

Within the theoretical framework of this paper, all such cases will be described in terms of a derivational stem containing {%}, which will be rewritten as {#} in forming the flexional stem of the base word ({BÚL%K–} $\xrightarrow{D}$ {búl#k–}) but as {V} in forming the derivational and flexional stems of the derived word ({BÚL%K–} $\xrightarrow{D}$ {búlok+#k} $\xrightarrow{D}$ {búloč#k–} etc.).(8) There is, however, another and quite

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(8)There remain several unanswered questions concerning the form and propriety of rules and resulting entities between the derivational stem of the base word ({BÚL%K–}) and the flexional stem of the derived word ({búloč#k–}); in particular, it is questionable whether it is necessary or desirable to posit the existence of derivational stems of derived words, rather than generating the latter's flexional stems directly out of the basic derivational stem. The validity of the theoretical framework adopted in this article cannot be judged until this and similar questions have been answered.

interesting avenue of inquiry, which can be sketched briefly here, in the form of an excursus on the cyclical application of morphophonemic rules.

5.1.3.1. On cyclical rules in derivational morphophonemics. The Slavic linguist, raised on the traditional explanation of the so-called "fall of the jers" (reduced vowels being counted as "strong" or "weak", always beginning from the final segment of a word, with no attention paid to boundaries between stem and ending, much less to those between derivational base and affix; "strong" jers become full vowels, and "weak" jers disappear) may be tempted to treat sequences of {#.◡,#} in modern Russian in a similar way, since the vowel-zero alternations of modern Russian have their origin in the loss and vocalization of the jers. That such a treatment will result in spurious forms can be seen with a simple example.

The diminutive бу́лочка, genitive plural бу́лочек, is derived from бу́лка by adding the suffix {#k} (with palatalization of stem-final {k} of the base). If the morpheme boundary is removed after palatalization, one obtains a stem with the form {búl#č#k-}; the forms of the nominative singular and genitive plural respectively have the forms {búl#č#ka} and {búl#č#k#}. Application of regressive (right-to-left) rules of the sort usually and superficially taken as an adequate explanation of the behavior of the jers will result in nominative singular [búləčkə] (бу́лочка) but

genitive plural *[bú́lčьk] (*булчек). Since the vague references to morphological analogy or generalization of stems, which in diachronic linguistics, serve to cover up the fact that certain supposed sound laws do not work very well, are entirely out of place in a synchronic description, a different explanation is clearly called for. One possible solution is to adopt cyclically applied rules of the sort first proposed by M. Halle.(9) Such rules would have the following form:

(1) {k} → {č} before {+#k}(10)

(2) {#} → {ø} in the environment: $__\begin{bmatrix} -\text{ voc} \\ +\text{ cons} \end{bmatrix} + \begin{bmatrix} +\text{ voc} \\ -\text{ cons} \end{bmatrix}$ (11)

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(9) Morris Halle, "O pravilax russkogo sprjaženija" (Predvaritel'noe soobščenie), American Contributions to the Fifth International Congress of Slavists, I, Linguistic Contributions, The Hague, 1963, pp. 113–132.

(10) This rule, which is not germane to the problem of vowel–zero alternations, is given here only informally. In a more general and precise form, covering the cases of {x} → {š} and {g} → {ž}, it would look something like:

[+ low tonality] → [– low tonality] in the environment:

$$__ \quad \begin{matrix} -\text{ voc} \\ +\text{ cons} \end{matrix} +\{\#k\}$$

and even here we shall not have accounted for the – → + continuant of {g} → {ž}, not to mention the problem of feature specification of {#}.

(11) The notation in this rule is a bit clumsy since the signs + and – between the consonant and the vowel refer to boundaries, i.e., what this rule says is that {#} becomes phonetic zero before a sequence of consonant plus boundary (stem–affix boundary or stem–ending boundary) plus vowel.

(3) $\{\#\} \rightarrow \begin{bmatrix} +\text{ voc} \\ -\text{ cons} \end{bmatrix}$ in the environment: $__ \begin{bmatrix} -\text{ voc} \\ +\text{ cons} \end{bmatrix}^{+}_{-}$ (12)

If applied to the underlying strings in two cycles, first to the smaller construct extending up to the stem–ending boundary ({–}) and then to the entire string, these rules will generate all and only the actually occurring phonetic representations, as follows (certain details of boundary removal being omitted):

| | Nominative Singular | Genitive Plural |
|---|---|---|
| First Cycle: | (búl#k+#k)–a | (búl#k+#k)–# |
| 1: | (búl#č+#k) | (búl#č+#k) |
| 2: | no change | no change |
| 3: | (búloč+#k) | (búloč+#k) |
| Second Cycle: | búloč#k–a | búloč#k–# |
| 1: | no change | no change |
| 2: | búločǿk–a | no change |
| 3: | no change | búloček–# |
| i.e., | бу́лочка | бу́лочек |

These rules work equally well in the case of {#}, which is buried more deeply in the constituent structure of a derived stem (or, to put it another way, which is further back in the derivational history of a derived word). From the word лёд, genitive льда́ ({l'#d–}) 'ice', Russian derives a singulative льди́на ({l'd'ín–}) 'block of ice', from which a diminutive льди́нка ({l'd'ín#k–}), cf. genitive plural льди́нок)

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(12) It is necessary to specify that the change {#} → [v] occurs only before the sequence consonant plus boundary in order to permit the first {#} of (búl#č+#k) to generate a vowel, while preventing the second {#} from doing so.

'piece of ice' is formed, the latter having a further diminutive льди́ночка, genitive plural льди́ночек ({1'd'íno$\check{c}$#k–}) 'little piece of ice'. The stem of this last word, then, has the following constituent structure:

<[(1'#d+ín)+#k]+#k>–

Application of rules (1) through (3) to the smallest construct (1'#d+ín) will generate (1'd'ín);[13] reapplication to the next larger construct [1'd'ín+#k] will generate [1'd'ín#k–], to the next larger construct (1'd'ín#k+#k) → (1'd'íno$\check{c}$#k–), and reapplication to the maximum constructs of the nominative singular and genitive plural, 1'd'íno$\check{c}$#k–a and 1'd'íno$\check{c}$#k–#, will generate the correct phonetic representations of льди́ночка and льди́ночек respectively. Furthermore, the correct flexional stems of all words in the derivational history of льди́ночка are also correctly generated by such rules. One is reminded of the saying that ontogeny recapitulates phylogeny.

Since rules (2) and (3) are the same as those needed to describe the behavior of {#} in flexion, they cause no complication in the grammar by being used in the derivational

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(13) Actually, an additional rule will be required, to account for the softening of the {d} of {1'#d–} to {d'} in {1'd'ín–}, but this is irrelevant to the present exposition. Furthermore, it is not clear whether it is more insightful and economical to account for such softening by morphophonemic rules, or — an alternative solution worthy of serious investigation — by positing two morphophonemes, {y} and {i} (a solution that, incidentally, would in no wise affect the phonemic status of phonetic [y] and [i], which are clearly both equal to /i/). The author hopes to return to this point in a future article.

system as well. However, the necessity of specifying the cyclical order of application of these rules, and of marking the constituent structure of all derived stems, which is an awkward matter in the case of words with discontinuous constituents, e.g., поддóнник 'dish under flower pots' from the stem {d#n–} of дно, plural дóнья 'bottom' and the discontinuous affix {pod+...+n'ik–} — not to mention the case of words like Причерномóрье 'Black Sea littoral' from the syntactic combination при Чёрном Мóре and the affix {#j–} — introduces complications of a type that are not easy to weigh against the advantages of the type of description just outlined. Final evaluation of the usefulness of cyclical rules in derivational morphophonemics will have to await further investigation.

## 5.2. {V} ~ {Ø} and {Ø} ~ {V} Alternations in Derivation

In all the vowel–zero alternations discussed above, the base form upon which the flexional or derivational rules operated contained the morphophoneme {#}; the behavior of this entity in derivation was quite similar to that in flexion (although far from identical; cf. лóбик, рóтик for the expected *лбик, *ртик). The flexional system has no parallel for the type of alternation that we shall now examine, however.

Russian contains a good many word families manifesting a type of vowel–zero alternation that as far as this author

knows has not been mentioned in the literature. This is a set of derivationally related words in which one member of the set contains a full vowel in its flexional stem (e.g., ме́бель, ме́бели 'furniture') but the other member contains no vowel — i.e., the stem vowel of the derivational base is "lost", as it were, in the process of derivation (cf. меблирова́ть 'to furnish'). In other cases, the opposite situation obtains: a flexional stem without a vowel acquires one in the course of entering a derived stem, e.g., игра́, genitive plural игр 'game' → diminutive игро́рка, adjective игро́рный, etc. Alternations of the first type ({V} → {Ø}) appear to be completely idiosyncratic, but those of the second type ({Ø} → {V}) are largely predictable in terms of the morphophonemic structure of the suffix with which they are combined. A sampling of each type will be presented below.

5.2.1. {V} → {Ø} alternations. Alternations of this type are due to the various time depths and source languages of borrowings, which of course does not simplify their description in CSR. Examples of such alternations: та́бель, genitive та́беля 'table (of ranks, etc.)' ({tábel'–}) → табли́ца 'table, plate' ({tabl'íc–}); ка́бель, ка́беля 'cable' ({kábel'–}) → каблогра́мма 'cablegram' ({kablográmm–}); ра́кель, ра́келя 'knife to scrape ink from typeface' ({rákel'–}) → раклі́ст 'printing shop foreman' ({rakl'íst–}); ско́бель, ско́беля 'spokeshave' ({skóbel'–}) → скобли́ть 'scrape, plane'

({skobl'í–}); ме́бель, ме́бели 'furniture' ({mébel'–}) → меблирова́ть 'to furnish' ({mebl'irová–}); ша́бер, ша́бера 'plane' ({šáber–}) → ша́брить 'to plane' ({šábr'i–}). In other, phonetically similar or even identical cases, the vowel of the original stem is preserved in the derived forms (this is especially true of derived verbs), e.g., моде́ль, моде́ли 'model' ({model'–}) → модели́ровать 'to model' ({model'írova–}), and similarly шта́бель, шта́беля 'stack, pile' → штабели́ровать; ни́кель, ни́келя 'nickel' → никелирова́ть; карте́ль, карте́ли 'cartel' → картели́ровать, etc. Words in both the alternating and non–alternating group do not appear to be marked in any way phonetically, for example by non–sharping of consonants before {e}. One must conclude therefore that pairs like моде́ль → модели́ровать and ме́бель → меблирова́ть are already distinctively marked on the level of the derivational stem, i.e., as

$$\begin{array}{ccc} \{\text{MODÉL'}\} & \xrightarrow{D} & \{\text{modél'–}\} \\ \downarrow & & \\ \{\text{MODEL'}\} & \xrightarrow{D} & \{\text{model'írova–}\} \end{array}$$

on the one hand and

$$\begin{array}{ccc} \{\text{MÉB\%L'}\} & \xrightarrow{D} & \{\text{mébel'–}\} \\ \downarrow & & \\ \{\text{MEBØL}\} & \xrightarrow{D} & \{\text{mebl'irová–}\} \end{array}$$

on the other. Similarly, the flexional stems of ни́кель, шта́бель, карте́ль are derived from underlying stems that also contain a full vowel ({E}), whereas та́бель, ско́бель, ша́бер, although their flexional stems contain the full vowel {e} just as do those of the first three words, must derive this

{e} not from a full vowel but from the derivational–level vowel~zero morphophoneme {%}.

5.2.2. {Ø} → {V} alternations. Alternations of the second type, i.e., in which the base word contains no vowel in a terminal cluster, but where such a vowel appears in derived forms, are more nearly predictable on phonetic grounds. Such alternations are particularly frequent (relatively speaking; there are in general not very many such words) in words containing velar + liquid clusters, e.g.: with {gr}, игра́, genitive plural игр 'game' ({igr–}) → diminutive игро́рка ({igór#k–}); ве́нгр, –а 'Hungarian' ({véngr–}) → feminine венге́рка ({vengér#k–}) and adjective венге́рский; with {gl}, игла́, genitive plural игл ({igl–}) → diminutive игло́лка ({igól#k–}), adjective игло́льный; ке́гля, more often plural ке́гли, genitive ке́глей 'skittles' ({kégl'–}) → adjective ке́гельный ({kégel'#n–}); with {kr}, и́скра, genitive plural искр 'spark' ({ískr–}) → diminutive и́скорка ({ískor#k–}); ша́нкр, –а 'chancre' ({šánkr–}) → ша́нкерный ({šánker#n–}); with {kl}, пу́кля, genitive plural пу́клей 'curls' (= бу́кли) for which Dal' gives the derived adjective пу́кольный, was the only example that could be found. Examples with the clusters {xr} and {xl} are of dubious validity in CSR: барахло́ 'trash' forms a derived substantive бараха́лка 'flea market', but since the base has no plural, one cannot assume that its stem is {baraxl–} rather than {barax#l–} (i.e., one cannot determine whether

one has to do with the alternation of {V} with {Ø} or with {#}); finally, махóрка 'cheap tobacco' ({махór#k–}) is undoubtedly derived from махрá, but since the latter is without a plural, one is left in the same uncertainty as with барахлó.

The cluster {kv} shows the same alternation as those above, e.g., ты́ква, genitive plural тыкв 'pumpkin' ({tíkv–}) → diminutive ты́ковка ({tíkov#k–}); бу́ква, букв 'letter' ({bukv–}) → бу́ковка ({búkov#k–}); смóква 'fig' and клю́ква 'cranberries' have no plurals but can, by phonetic analogy with ты́ква and бу́ква, be assumed to have the stems {smókv–} and {kl'úkv–} respectively, and form смоко́вница 'figtree' ({smokóvn'ic–}) and the diminutive клю́ковка ({kl'úkov#k–}). The same alternation appears in some derived adjectives, e.g., ты́ковный beside ты́квенный, клю́ковный (Dal') beside клю́квенный, but only бу́квенный.

The {Ø} → {V} alternation is somewhat less frequent in words not containing velars in the final cluster. The group stop + liquid takes an "inserted" vowel in derivation in several borrowed words, e.g., with {str}, маги́стр 'master' ({magístr–} → маги́сте́рство and маги́сте́рский; мини́стр 'minister' → мини́сте́рство 'ministry'; with {bl}, кора́бль 'ship' ({korabl'–}) → корабе́льный 'naval' and корабе́льщик 'sailor'; дирижа́бль 'dirigible' → adjective дирижа́бельный.

Other clusters occur only in isolated examples, e.g., бе́здна, genitive plural бе́здн 'abyss' ({bézn–}) → бездóнный

({bezdón#n–}); (14) пóйма, genitive plural пóйм 'area flooded in spring' ({pójm–}) → поёмный and поёмистый, both 'flooded in spring' ({pojóm#n–}, {pojóm'ist–}). (15)

Most of the above clusters have consisted of an obstruent stop followed by a non–obstruent of {v}. The alternation {Ø} → {V} appears in a cluster of continuant + obstruent stop only in the two words слýжба, genitive plural слýжб 'service' ({slúžb–}) → служéбный 'official' ({služéb#n–}), and тя́жба (no plural, but presumedly *тяжб) 'lawsuit' ({t'ážb–}) → тя́жебный 'legal' ({t'ážeb#n–}); the word усáдьба 'estate' has two plurals, усáдьб and усáдеб, and forms the derived adjective усáдебный, which therefore shows both the {Ø} → {V} alternation like слýжба, слýжб, служéбный and the {#} → {V} alternation, like e.g., свáдьба, genitive plural свáдеб 'wedding' adjective свáдебный.

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(14) Incidentally, the {d} of this form provides an additional argument in favor of the theoretical framework adopted in this paper; note that there is no reason to posit a {d} in the flexional stem of бéздна taken by itself since no form of this word's paradigm contains a phonetic [d]. Within the derivational system, however, morphophonemic {D} not only makes patent the "derivational history" of бéздна (← без дна), but permits the generation of the derived form безднóнный, with its flexional {d}; note also that there is no way to derive flexional {bezdón#n–} from the flexional stem of its base, {bézn–}. In other words, this group of words provides additional evidence that derivation operates at a level deeper than that of flexional stems.

(15) Both the derived adjectives were actually historically formed from the dialectal substantive поём, genitive поёма ({pojóm–}), which does not of course affect the fact that they are synchronically derived from пóйма.

Examination of the above alternations in terms of distinctive features sheds a certain amount of light on the regularities underlying the alternations. Thus, of the two +consonantal segments interrupted by the inserted {v} in derivation, the first is usually + compact, and the second either -compact (/kv/, /žb/) or not marked for compactness (/kr/, /kl/, /gr/, /gl/). Furthermore, the first consonant of such clusters is usually marked by more + features than the second, and there where the number of + features is equal, those of the first consonant occur earlier ("higher") in the feature matrix.(16) The only generalization permitted by these observations is that the inserted {v} tends to occur in clusters of decreasing feature complexity.

## 6. CONCLUSION

This Memorandum has attempted to survey the vowel-zero alternations in Russian flexion and derivation. It was pointed out that the morphophonemic rules for vocalization or reduction to phonetic zero of the vowel~zero morphophoneme in flexion differ from those in derivation, although some generalization can be obtained at the price of introducing cyclical rules into derivational morphophonemics.

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(16) These remarks utilize the distinctive feature matrix suggested by M. Halle, The Sound Pattern of Russian, Mouton and Co., The Hague, 1959, p. 46. The nasality, continuant, voicing and sharping features, which clearly play no role in the alternations being discussed, are omitted.

Of those alternations that are evident exclusively on the derivational level, some are more nearly predictable on the basis of flexional stems plus phonetic rules than others, but it is suggested that all such alternations, taken together, can best be described in a framework that posits a derivational stem out of which the derivational morphophonemic rules generate the several flexional stems (of the base word and of its derivatives) of each word family. The interrelation of these derivational and flexional rules, insofar as they concern vowel~zero morphophonemes and their representatives, can be shown as:

$$\{\%\} \xrightarrow{D} \begin{cases} \{V\} \\ \{\#\} \\ \{\emptyset\} \end{cases} \xrightarrow{F} \begin{cases} [v] \\ [\emptyset] \end{cases}$$

in which the large curved brackets enclose sets of choices to be made on the basis of environments discussed in detail in the foregoing.